lect. 2

25/12/2013

* Numbers Systems:

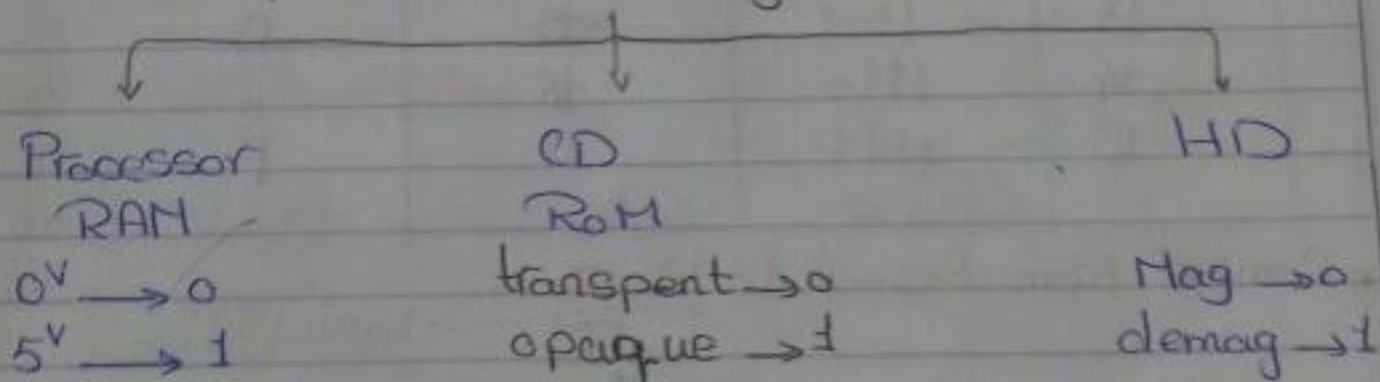
- Numbers Systems
- Binary, hexa-decimal, octal
  Converting bet. System.
- (-ve) numbers in Binary.
- Fractional numbers.
- Ascii Code.
- Adding Binary Numbers

⇒ In decimal Number System:-

We have (10) digits (0, 1, 2, ---, 9 and base (10)

$714 = 7\times(\text{base})^2 + 1\times(\text{base})^1 \times 7\times(\text{base})^2$

* Computer is more able to use two-types of digit (0 or 1)
So in Computer we use binary System.

Processor RAM	CD RoM	HD
$0^V \rightarrow 0$	transpent → 0	Mag → 0
$5^V \rightarrow 1$	opaque → 1	demag → 1

* In Binary System:

Base → (2) — Digits (0, 1)

8	4	2	1
2^3	2^2	2^1	2^0

| 1 | 1 | 0 | 1 | $= 1\times2^3 + 1\times2^2 + 0\times2^1 + 1\times2^0$

$= 13$

decimal	binary	octal	hexadecimal
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

* Convert from decimal to binary → base (2)

14	2	0	ls
7	2	1	↑
3	2	1	↑
1	2	1	Ms (most Sgnfcd.
0			

$(14)_d = (1110)_b$

2^3	2^2	2^1	2^0
1	1	1	0

الرقم لما يضرب x2 زي أكتر

26	2	0
13	2	1
6	2	0
3	2	1
1	2	1
0		

L.S ↑ M.S

$26 = (11010)_B$

$26 = (11010)_2$

*** Convert 26 to octal:** → base $(2^3) = 8$

26	8	2
3	8	3
0		

$(32)_8$

*** Hexadecimal:**

$(26)_J = (1A)_H$

26	16
1	16
0	

*** Convert $(11010)_B$ to octal:**

Take each 3 digits and write their in octal

0 1 1 0 1 0

$(32)_O$

*** Convert $(11010)_B$ to hexa:** → base(2^4)

1 1010

$(1A)_H$

Even number in binary Start with 0 or 1

* What is the relation between x in binary and 2x binary

13	2	1
6	2	0
3	2	1
1	2	1

↑ (1101)

*

52	2	0
26	2	0
13	2	1
6	2	0
3	2	1
1	2	1
0		

{ 0 ≡ x2
00 ≡ x4
000 ≡ x8 }

⇒ Fractional numbers :-

* $(0.5)_{dec} = (\quad)_B$?!

$0.5 = \frac{5}{10} = \frac{?}{2}$

$0.5 \times 2 = 1$

0

$0.5 = (0.1)_B$

* $B^2 \; B^1 \; B^0 \; B^{-1} \; B^{-2} \; B^{-3}$

102.53

$10^2 \; 10^1 \; 10^0 \; 10^{-1} \; 10^{-2}$

* eg.

0.53 x 10
~~5~~.3 x 10
.3 x 10
3

$\Rightarrow 0 . B^{-1} B^{-2} B^{-3}$
~~B_1~~ . B_2 B_2 ---- x B

Base ②

* $(0.3)_{dec} = (\quad)_B$? $0.0\overline{1001}$ → علامة لما ال decimal يتكرر زي 0.6 لما اتكررت

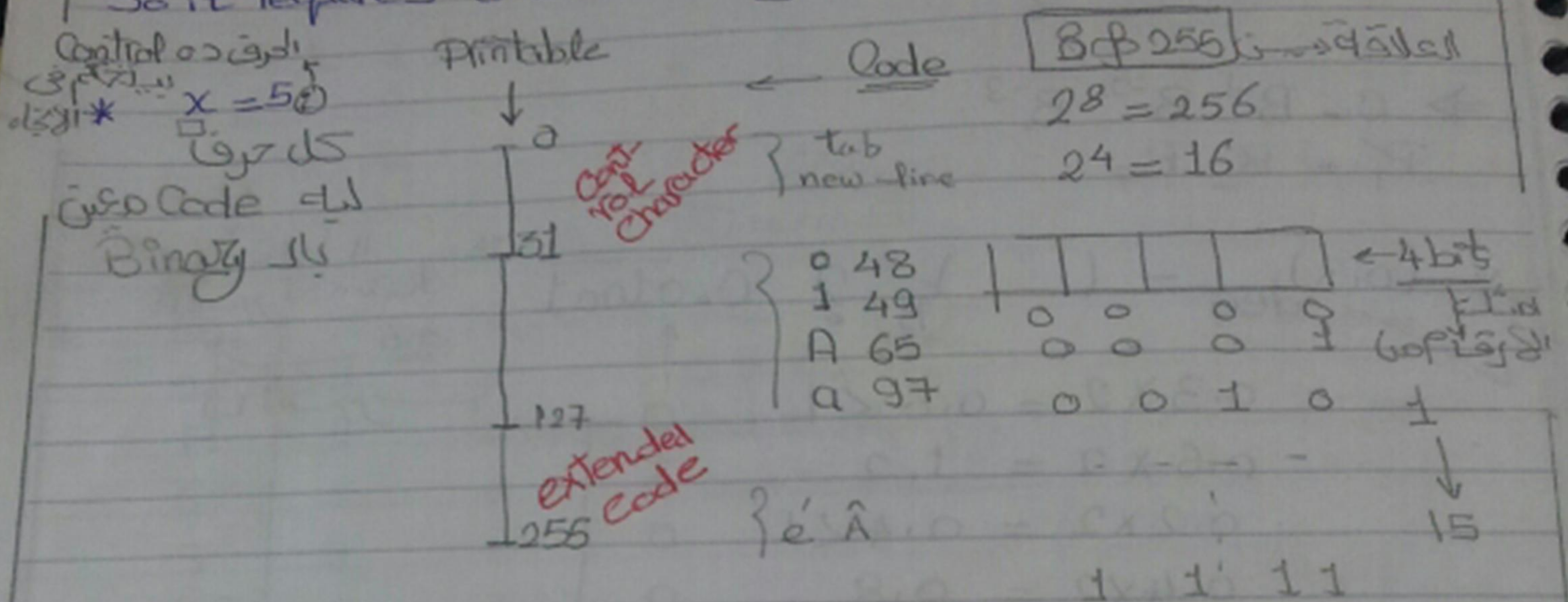
0.3 x 2 = 0.6 < 1 — 0
0.6 x 2 = 1.2 — 1
0.2 x 2 = 0.4 < 1 — 0
0.4 x 2 = 0.8 — 0
0.8 x 2 = 1.6 — 1
0.6 x

اتكررت

$\Rightarrow (0.01)_2 < (0.3)_{dec}$ ⟹ عشان اشوف مين قيمتهم اكبر (هحاول ال Binary ل dec.

Base

عشان اقدر اقارن بينهم

$1 \times 2^{-2} = \frac{1}{4} = 0.25$

ASCi Code :
IS a standard code to represent all printable Characters in keyboard has range from 0→255
So it requires 8 bits = 1 byte
Control
Printable
Code
x = 5
كل حرف
ليه Code معين
Binary بال
0
Control character
tab
new line
$2^8 = 256$
$2^4 = 16$
31
0 48
1 49
A 65
a 97
← 4 bit
0 0 0 0
0 0 0 1
0 0 1 0
1
15
127
extended code
255
é Â
1 1 1 1
Convert from decimal to binary :
97 2 0
48 2 0
24 2 0
12 2 0
6 2 0
3 2 1
1 1
97 binary
0110 0001
* Uni Code :
1_ letter takes two byte
language code
letters within language